



RAS

Rajasthan Administrative Services

Rajasthan Public Service Commission

Volume - 5

Geography of Rajasthan



RAS

Geography of Rajasthan

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PREVIOUS YEAR QUESTIONS

- Q1. Which of the following group of districts are correctly arranged in descending order as per the amount of monsoon rainfall they receive? (2023)
- | | |
|--------------------------------|-----------------------------|
| (1) Dholpur, Rajsamand, Jalore | (2) Bhilwara, Baran, Sikar |
| (3) Rajsamand, Jalore, Dholpur | (4) Pali, Jaipur, Bharatpur |
| (5) Question not attempted | |
- Q2. As per Koeppen's climate classification, which among the following are correctly matched? (2021)
- | | |
|-----------------------|----------------------|
| (A) Cwg - Bharatpur | (B) Bwhw-Barmer |
| (C) Bshw-Ganganagar | (D) Aw-Dungarpur |
| (1) (A), (C), and (D) | (2) (B), (C) and (D) |
| (3) (B) and (C) | (4) (A) and (D) |
- Q3. The dust storms originating in Rajasthan in May and June months are caused due to (2018)
- | | |
|---|----------------------|
| (A) Origin of convectional currents at few places | |
| (B) Aravalli hills are parallel to south- western winds | |
| (C) Origin of fast speedy easterly winds | |
| (1) (A) and (C) | (2) (A), (B) and (C) |
| (3) (A) and (B) | (4) Only (A) |

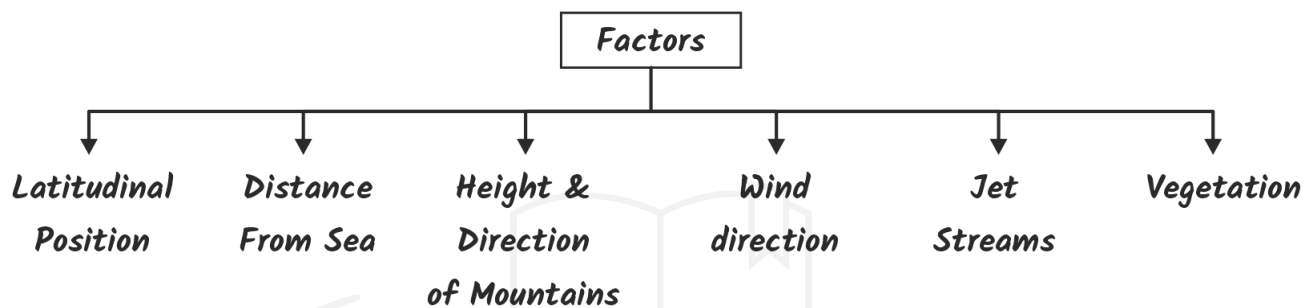
Analysis - The previous year questions on climate in Rajasthan indicate a consistent focus, typically featuring at least one question per year. They are primarily factual in nature with some testing the concepts. To prepare effectively, the key areas include rainfall patterns, Koeppen's climate classification, and factors behind weather phenomena. Maps and flow charts have been provided in the chapter for easier retention.

- Climate** - The prevailing weather conditions in a region normally or over a long period of time.
- The climate of Rajasthan has many spatial diversities. Most part of Rajasthan comes under the temperate tropical climate zone.
 - The climate of Rajasthan is broadly classified as monsoon type of climate.

1. Characteristics of Climate of Rajasthan

- Rajasthan has a dry and humid monsoon climate.
- Large daily and yearly temperature variations due to desert.
 - ✓ Summer: Temperature can reach up to 49°C with intense heat waves.
 - ✓ Winter: Temperature may drop to freezing point in some areas.
- Most rainfall occurs during the monsoon, with variable distribution.
- Inadequate and uncertain rainfall
- Drought and Famine

2. Factors Influencing Climate



1. **Latitudinal Position** – Rajasthan is located between 23°03'N to 30°12' N. Hence, sub-tropical climate is found.
2. **Distance from Sea:** As Rajasthan is far from the sea, the climate of Rajasthan does not experience the moderating effect of sea.
3. **Height and Direction of Mountains:** The Aravalli range runs parallel to the Arabian Sea branch of the monsoon, leading to less rainfall.
4. **Orographic Factors** – Bay of Bengal Branch leads to greater rainfall in S-E Rajasthan while very less rainfall in W-Rajasthan due to rain shadow regions of Aravalli ranges.
5. **Wind Direction:** Wind from the Bay of Bengal monsoon branch bring rainfall primarily to south-east Rajasthan.
6. **Jet Streams:** These high-altitude air currents are responsible for winter monsoon. The sub-tropical westerly jet stream also contributes to cold waves.
7. **Vegetation:** The lack of vegetation in the desert areas contributes to the region's extreme temperatures.

3. Seasons in Rajasthan

- In Rajasthan, on the basis of climate, the seasons are mainly divided into three parts.



3.1 Summer Season (March to Mid-June)

- With the apparent northward movement of the sun towards the Tropic of Cancer, the temperature starts rising in Rajasthan.
- April, May and June are the hottest months of the year.
- Due to extreme heat, low air pressure is developed in western part of Rajasthan.
- Hot and dusty winds, known as 'Loo', begin to blow.
- The region also experiences sand storms.

Loo

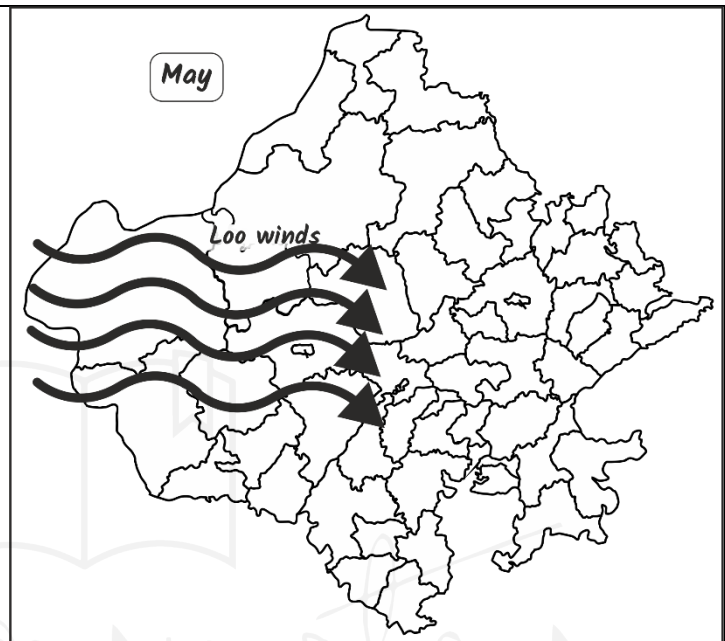
- These are local winds that blow from west to east direction.
- Reason - Advection/ horizontal movement of wind.
- Most affected - Barmer

Bhabhulya

- Dusty and cyclonic winds in summer.
- Maximum - Bikaner

Sand Storms

- These are dusty and humid winds.
- These are meteorological events that occur when strong winds lift large amounts of sand and dust particles from the ground and transport them over long distances.
- Maximum - Sri Ganganagar



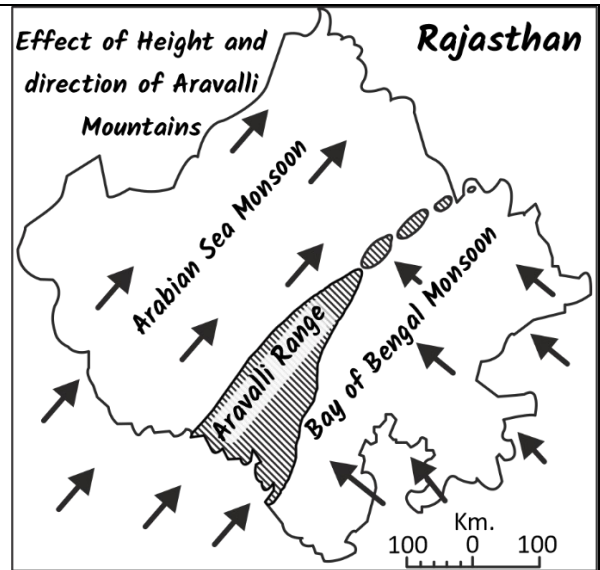
3.2 Monsoon/Rainy season (mid-June to September)

- Due to excessive heat in May, the low pressure in Rajasthan gets further intensified.
- By early June, the region attracts the trade winds of Southern Hemisphere coming from the Indian Ocean.
- So, monsoon winds start moving to terrestrial low pressure from oceanic high pressure.
- Rajasthan receives rainfall from both the Arabian Sea branch and the Bay of Bengal branch.
- The Bay of Bengal branch of the monsoon is more dominant in north, east and southeastern Rajasthan due to the specific location of the Aravalli.
- 50 cm Isohyet divides the state into two parts.
 - ✓ Arid and semi-arid desert lies to the west of the line.
 - ✓ Humid and Very Humid region lies to the east of the line.

- Most of the state's rainfall occurs in this season.
- Rainfall in the state decreases from east to west and from south to north.

Q. Why does Rajasthan receive very little rainfall?

- The Bay of Bengal branch loses most of its moisture while passing through the Gangetic plain.
- Moreover, the Aravalli range extends from the southwest to the northeast. So, the western part of Rajasthan lies downstream of the Bay of Bengal branch and receives little or no rainfall from this branch.
- The Aravalli range lies parallel to the direction of the Arabian Sea branch, thus, failing to disrupt its monsoon flow.
- However, in the southern Aravalli, the mountains extend slightly east-west, that allows Mount Abu in the south to receive the highest rainfall.
- Lack of vegetation in western Rajasthan.



Rajasthan: Effect of height and direction of Aravalli Mountains on monsoon winds.

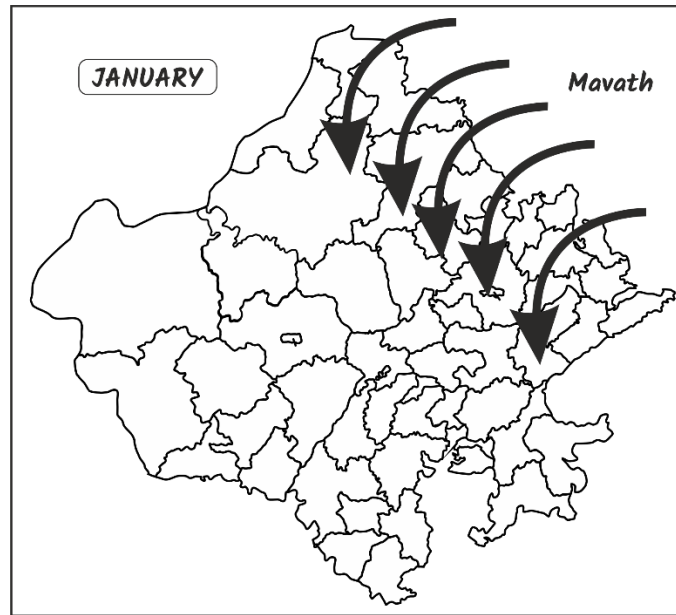
4. Retreating Monsoon

- In October, the monsoon winds start withdrawing as the terrestrial low-pressure area disappears and a new low-pressure area develops in the Indian Ocean due to rising temperature.
- October to mid-November: The weather remains humid due to high temperature and high humidity.
- By the end of October, the maximum temperature reaches 35°C while the minimum drops to 20°C.
- This period marks the withdrawal of the monsoon, characterized by calm, very light, and highly variable winds.

4.1 Dry Winter (November to February)

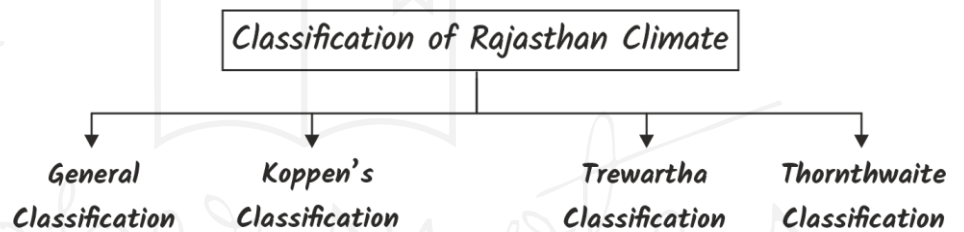
- The actual winter season arrives in the state in December because the sun's position shifts to the southern hemisphere.
- North-westerly cold winds begin to blow across the state.
- In December and January, temperate cyclones from the west cause light rainfall.
 - ✓ It is called 'Mavath' in the local language.
 - ✓ This rain is beneficial for the rabi crop so called golden drops.

- When snowfall occurs in the Himalayan region, Rajasthan experiences cold waves and the temperature drop to the freezing point in many areas like Sikar, Churu, Phalodi etc.



5. Classification of Rajasthan Climate

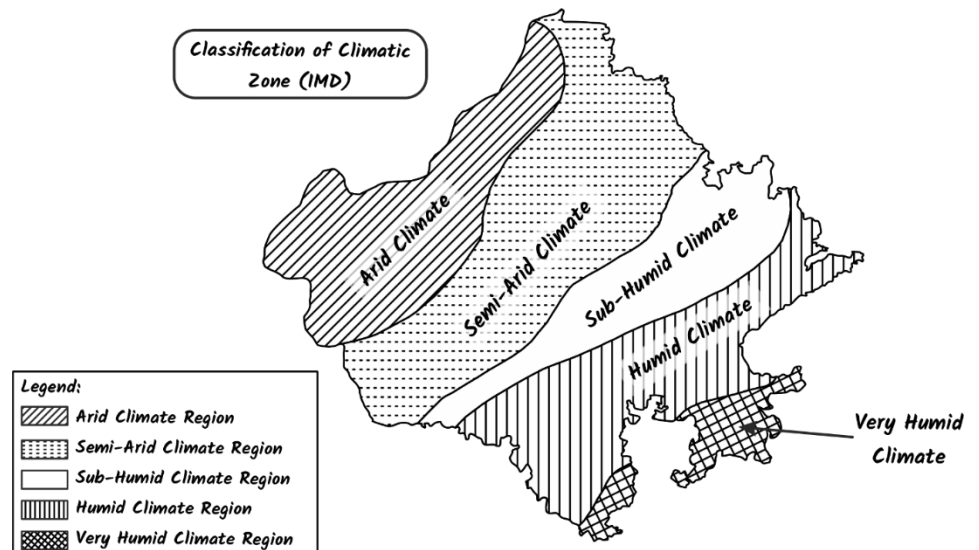
- **Climatic Zones** - Regions where all climatic factors generally remain the same for a particular region.



- Various experts have divided the state of Rajasthan into different climatic zones based on factors like rainfall, temperature, evaporation, vegetation, etc.

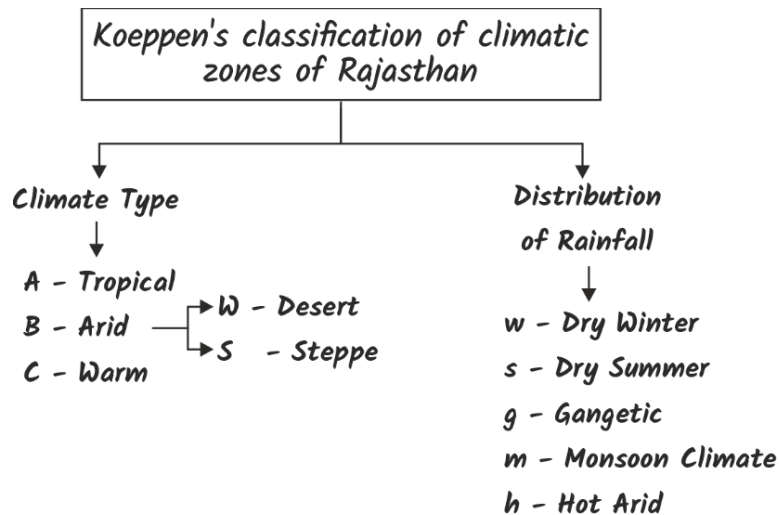
5.1 General Classification

- The Indian Meteorological Department has divided Rajasthan into five climatic zones based on rainfall.

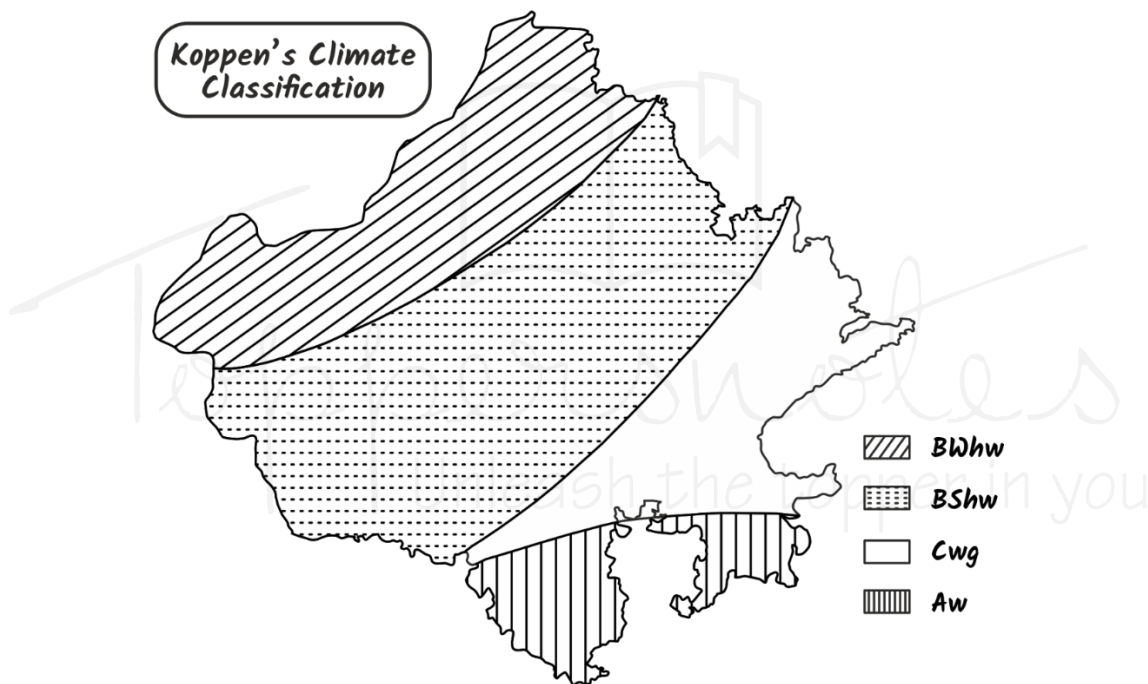


	Arid	Semi-Arid	Sub-Humid	Humid	Very-Humid
<i>Rainfall</i>	<i>less than 25 cm</i>	<i>20-40cm</i>	<i>40-60 cm</i>	<i>60-80 cm</i>	<i>80-120 cm</i>
<i>Districts</i>	<i>Jaisalmer, Barmer, Phalodi, Bikaner and Anupgarh</i>	<i>Sri Ganganagar, Hanumangarh, Churu, Balotra, Bikaner and Jodhpur rural and western part of Pali, Jalore, Sanchore, Sikar, Nagaur and Jhunjhunu (Bangar region)</i>	<i>Alwar, Kotputli - Behror, Khairthal - Tijara, Jaipur, Ajmer etc. (Chambal basin and Banas basin)</i>	<i>Bharatpur, Dholpur, Sawai Madhopur, Bundi, Kota, Barmer, Rajsamand and Udaipur.</i>	<i>Kota, Baran, Jhalawar, Banswara, south-west Udaipur and adjoining areas of Mount Abu.</i>
<i>Features</i>	<i>The climate of this region is very dry and hot. Thus, sand-laden winds and 'heat waves' are the main features of this region.</i>	<i>Rainfall is erratic as well as torrential which usually leads to flooding.</i>	<i>Rainfall is scarce and the amount of rainfall is restricted to only a few monsoon months.</i>	<i>The region receives monsoon season rainfall as well as winter rainfall.</i>	<i>The summers are very hot, and winters are cold and dry.</i>
<i>Vegetation</i>	<i>No vegetation. The area is full of sand dunes.</i>	<i>Thorny shrubs and grasses</i>	<i>Steppe type vegetation</i>	<i>Deciduous trees dominate here.</i>	<i>Monsoon savannah type of vegetation</i>
<i>Physical Division</i>	<i>N-W desert</i>	<i>N-W desert</i>	<i>Aravalli</i>	<i>Eastern plains</i>	<i>South Eastern Plateau</i>

5.2 Koeppen's Classification



- According to Koppen's classification, the climate of Rajasthan is divided into four parts on the basis of vegetation, temperature and rainfall.



Comparative Analysis of regions classified by Koppen

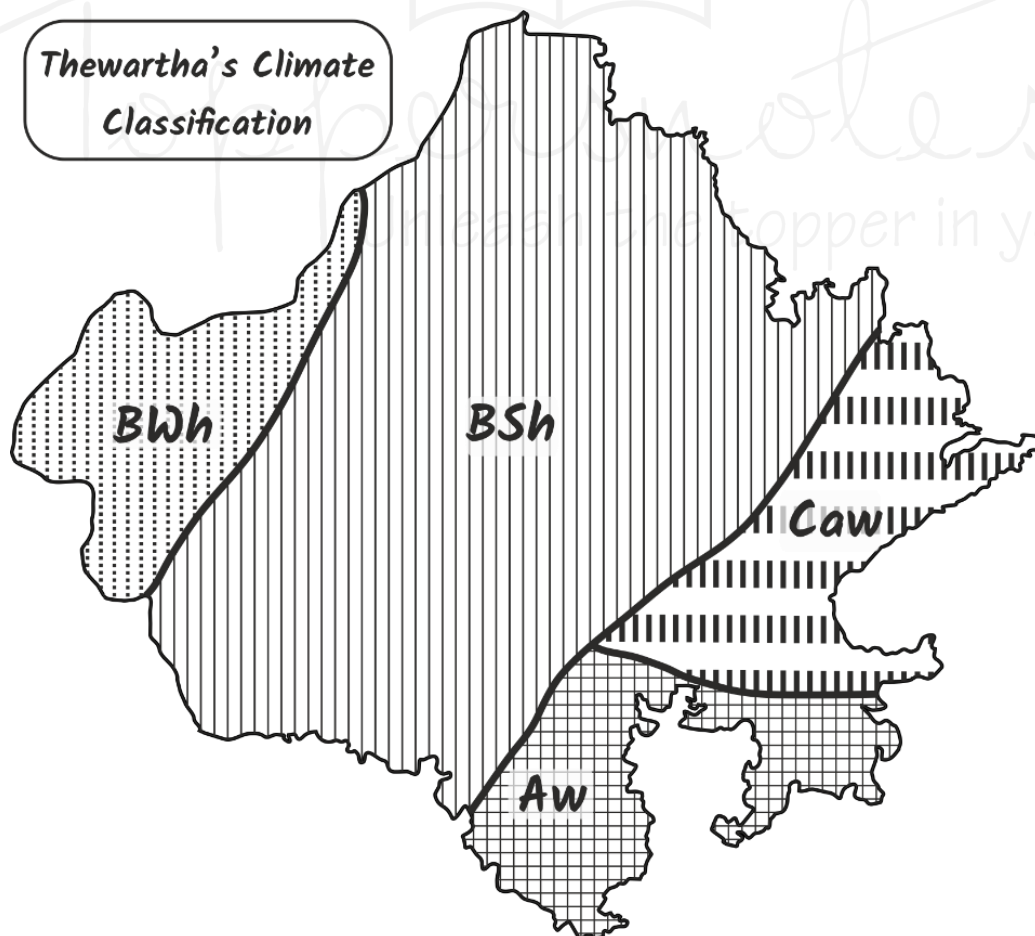
Climate Type	BWhw	BShw	Cwg	Aw
Name	Dry Desert	Semi Arid Desert	Semi Humid	Tropic Humid
Extent	Jaisalmer, Bikaner, Sri Ganganagar, Hanumangarh, Churu	Luni Basin, Ghaggar Basin, Nagaur and Shekhawati	Alwar, Bharatpur, Karauli, Tonk, Dholpur, Rajsamand, Sirohi, Sawai Madhopur, Udaipur and Jaipur	Vagad region, Mount Abu, Hadoti

Vegetation	Xerophytes	Steppes type	Dry deciduous vegetation	Savannah type
Rainfall	0-20 cm	20-40 cm	40-80 cm	80-120 cm
Other	Thorny vegetation is found here.	Largest climatic region as per Koppen's classification.	Maximum population density and agriculture productivity.	Dense vegetation is found here.

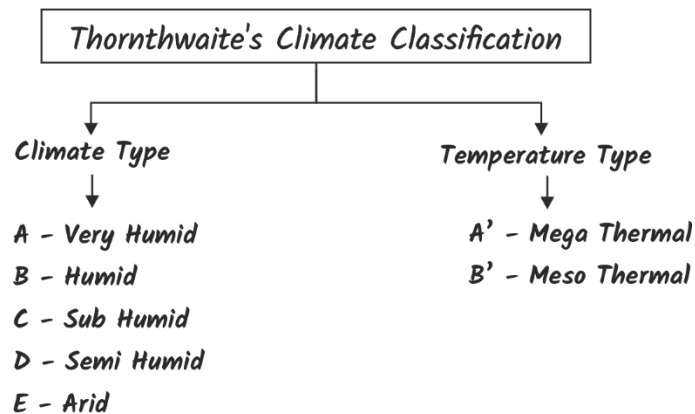
6. Trewartha's Climate Classification

➤ He classified the climate on the basis of temperature, humidity, rainfall, relief and vegetation.

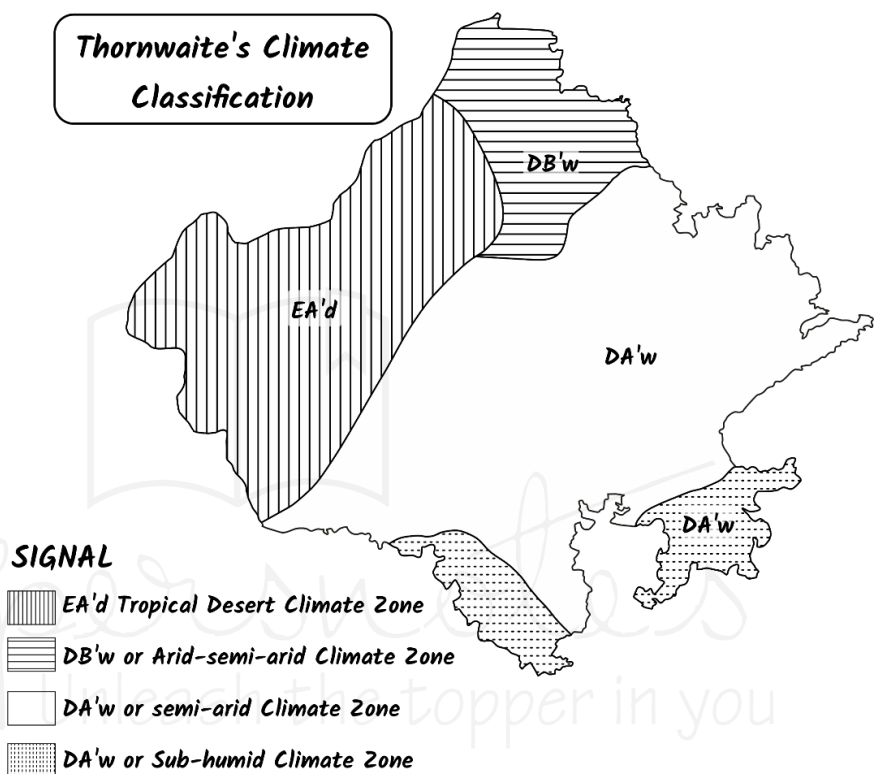
	Climate zone	Region
BWh	Arid	Jaisalmer, Barmer, Bikaner
BSh	Tropical and semi-tropical steppe	Nagaur, Churu, Jhunjhunu, Pali, Bikaner, Sri Ganganagar, Hanumangarh etc.
Caw	Sub-tropical humid	Vindhyan plateau of Southern & Eastern Rajasthan
Aw	Tropical Humid	Mainly in south eastern Rajasthan (Hadoti region)



7. Thornthwaite's Climate Classification



- Rainfall (precipitation and evaporation) is the basis of this classification.
- It divides Rajasthan's climate into four parts



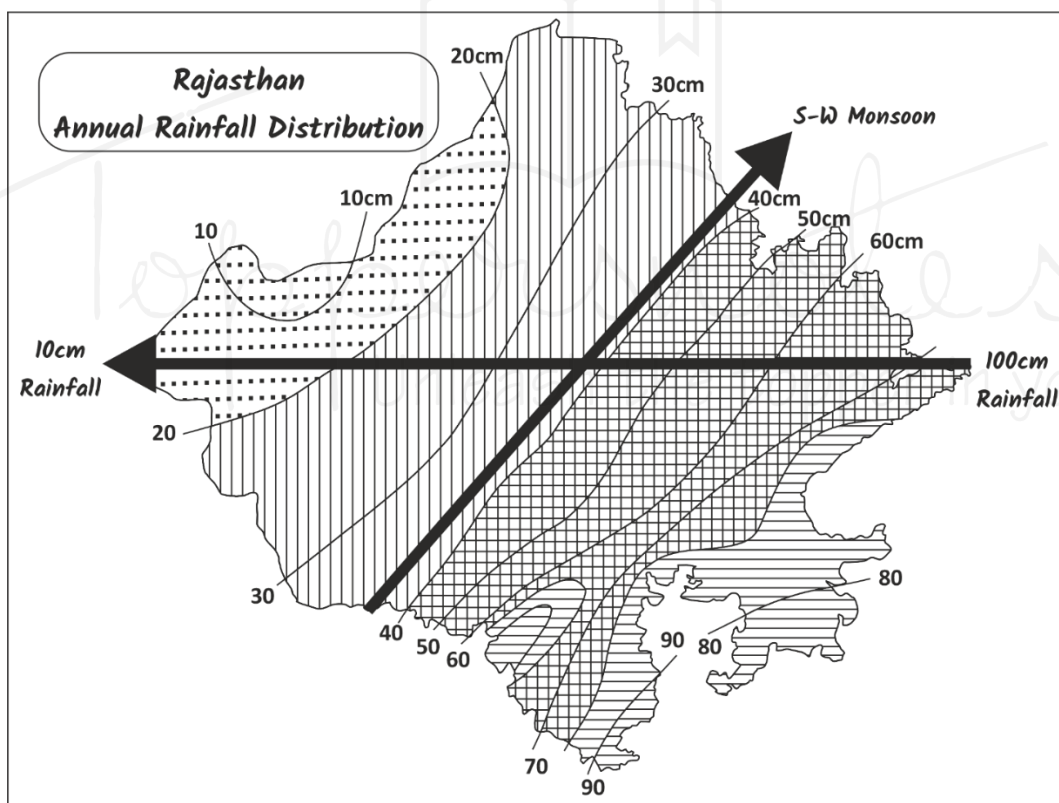
	CA'w	DA'w	DB'w	EA'd
Climate	Humid	Semi-Arid	Arid and Semi-Arid	Dry Climate
Districts	Udaipur, Banswara, Dungarpur, Kota, Baran and Jhalawar	Sirohi, Sanchore, Jalore, Pali, Ajmer, Beawar, Chittorgarh, Bundi, Sawai Madhopur, Kekri, Shahpura, Tonk, Bhilwara, Gangapur City, Bharatpur, Deeg, Jaipur, Dausa, Dudu, Didwana-Kuchaman, Alwar, Kotputli-Behror, Sikar, Neem ka Thana and Jhunjhunu.	Sri Ganganagar, Anupgarh, Hanumangarh, Churu, Bikaner and Jhunjhunu.	Barmer, Jaisalmer, Phalodi, Bikaner

8. Rainfall in Rajasthan

- Rajasthan receives 95% of its annual rainfall during the southwest monsoon.
- Isohyet Line: Line joining areas receiving same rainfall.
- The distribution of rainfall is uneven.
 - ✓ The western desert receives the minimum annual average of 25 cm.
 - ✓ The eastern part of Rajasthan receives a minimum average of 50 cm.
- Average Rainfall -57.5 cm
- S-W monsoon (85-90%) while the remaining (5-10%) is from western disturbances.

8.1 Distribution of rainfall in Rajasthan

- 50 cm Isohyet line divides Rajasthan in two equal parts and runs parallel to Aravalli ranges.
- The region to the right of this (50cm Isohyet line) receives more rainfall while the left side region receives less rainfall.
- Jaisalmer: 10-25 cm, Mount Abu: 150 cm



NOTE

- Highest rainfall occurs in the southern and southeastern districts of Rajasthan.
- Jaisalmer receives the least rainfall in the north and northwest.
- Maximum rainfall - Jhalawar district